

## Ultra-Miniature High-power Pulsed Microchip Lasers, Phase I

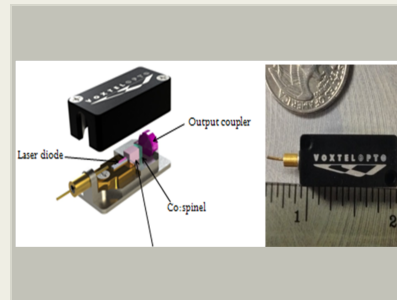
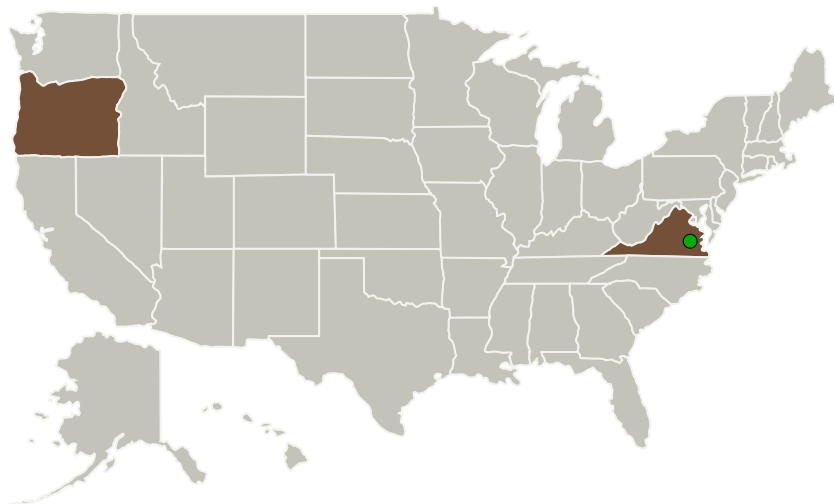
Completed Technology Project (2015 - 2016)



## Project Introduction

Interest is rapidly growing in eye-safe solid-state lasers for range finding, LIDAR, infrared countermeasures, medicine, dentistry, and others. To address the need for compact, high efficiency lasers operating in this important spectral band, an ultra-compact turnkey, narrow-band, high-mode-quality, high-pulse-energy, and high-pulse-repetition-frequency (PRF), diode-pumped solid-state (DPSS) pulsed laser system will be developed that, due to superior near infrared (NIR) absorption characteristics, high phonon energies, and good thermal characteristics, can be used in an optically thin configuration, which, when properly designed, including using a directly-mounted thermally conductive index matched window, allows for very high average power in the 1500 – 1600-nm spectral band. The laser is based on a new material system. The new innovative laser will be shown to best satisfy NASA remote sensing, mapping, and navigation and hazard avoidance applications by offering 0.2 mJ – 2 mJ (1550 nm) at pulse rates from 10 Hz to 100 KHz. In Phase I, existing analytical laser models will be updated, integrated with optical models, and a candidate laser design will be developed. The new laser material will then be configured in end-pumped passive- and actively-Q-switched laser designs, and the laser output as a function of pump power, pump energy, and pump repetition rate will be characterized.

## Primary U.S. Work Locations and Key Partners



Ultra-Miniature High-power Pulsed Microchip Lasers, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

## Ultra-Miniature High-power Pulsed Microchip Lasers, Phase I

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Organizations Performing Work	Role	Type	Location
Voxtel, Inc.	Lead Organization	Industry	Beaverton, Oregon
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Oregon State University	Supporting Organization	Academia	Corvallis, Oregon

## Primary U.S. Work Locations

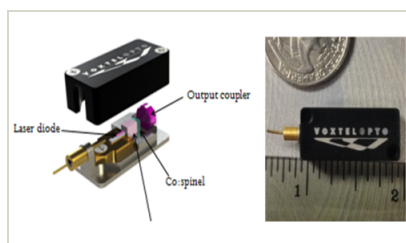
Oregon Virginia

## Project Transitions

**June 2015:** Project Start**June 2016:** Closed out**Closeout Summary:** Ultra-Miniature High-power Pulsed Microchip Lasers, Phase I Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/139510>)

## Images

**Briefing Chart Image**

Ultra-Miniature High-power Pulsed Microchip Lasers, Phase I  
(<https://techport.nasa.gov/image/127403>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Voxtel, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

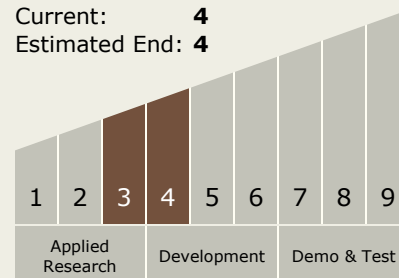
Carlos Torrez

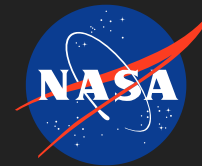
**Principal Investigator:**

Anmol Nijjar

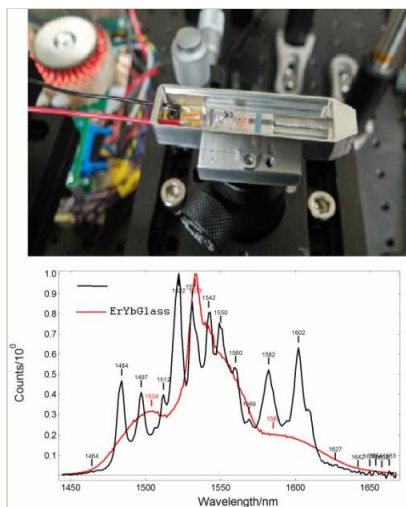
## Technology Maturity (TRL)

Start: 3  
Current: 4  
Estimated End: 4





## Completed Technology Project (2015 - 2016)



Ultra-Miniature High-power Pulsed  
Microchip Lasers, Phase I Project  
Image

(<https://techport.nasa.gov/image/130313>)

## Technology Areas

- TX09 Entry, Descent, and Landing
  - └ TX09.3 Landing
    - └ TX09.3.1 Touchdown Systems

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System